Income Distribution, Political Instability, and Investment

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September 1992

Discussion Paper Series No. 625

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Alberto Alesina gratefully acknowledges financial support from the Institute for Policy Research.

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Abstract

This paper successfuly tests on a sample of 72 countries for the periods 1960-85 and 1970-85 the following hypotheses. Income inequality, by fueling social discontent, increases socio-political instability. The latter, by creating uncertainty in the politico-economic environment, reduces investment and therefore economic growth. As a consequence, income inequality and economic growth are inversely related.

We measure socio-political instability with a composite index which captures the occurrence of more or less violent phenomena of political unrest. Our hypotheses are tested by estimating a two-equation model in which the endogenous variables are investment and our variable of socio-political instability.

Our results are robust to sensitivity analysis on the specification of the model and are essentially unchanged when the model is estimated using robust regression techniques.

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1 Introduction.

The relationship between growth and investment, income inequality and political instability is very complex. The literature on this subject is vast and recently picked up speed with several theoretical and empirical studies. The latter have made use of large cross-section and/or panel regressions, using large samples of many countries.

It is possible to identify two strands of recent papers on this subject. The first one deals with the rlationship between income distribution and growth. The second one focuses on the relationship between political stability and various measures of economic activity, such as growth, investment, savings and inflation.

The first branch of the literature has identified three possible channels through which income inequality may affect economic growth negatively. The first one (Galor and Zeira (1988), Bannerjee and Newman (1991) and Aghion and Bolton (1992)) emphasizes the role of imperfect capital markets. The basic idea is that, since economic agents cannot borrow against their expected future income, for example to invest in human capital, the initial distribution of resources determines how many agents can invest. The second approach emphasizes the role of income distribution via its effects on the incentives to engage in rent-seeking activities (Benhabib and Rustichini (1991)). The third approach establishes a connection between income (or wealth) distribution, demand for fiscal redistribution and economic growth. The basic idea which is common to recent papers by Alesina and Rodrik (1991), (1992), Perotti (1990), Bertola (1991), and Persson and Tabellini (1991) is the following. The lower the median income is relative to the average income, the more the decisive voter, i.e. the voter with median income, is in favor

of redistribution through the fiscal system. In turn, fiscal redistribution has negative effects on growth because of the distortionary taxes which are needed to finance this policy. If the measure of inequality is taken to be the distance between the median income and the average income, this literature implies a positive correlation between income inequality and transfers and a negative one between transfers and growth. These two correlations together imply a negative relationship between income inequality and growth.[1] Reduced form regressions (Alesina and Rodrik (1991), (1992) and Persson and Tabellini (1991)) confirm this hypothesis.[2]

Perotti (1992), however, challenged these findings by looking at the intermediate step (i.e. fiscal policy) which, according to the theory, is supposed to link income distribution and growth. First he showed no relationship (and in some specifications the wrong sign) between the share of the third quintile of the income distribution (where the median voter belongs) and the amount of government transfers or government investment in public projects. Second, he shows no relationship (and, again, the wrong sign in some cases) in the relation between government transfers and growth.[3] These findings call for further investigation on the possible channels linking income inequality and growth.

In this paper we test a fourth channel that can explain a negative effect of income inequality on growth. Specifically, we investigate whether the link between income distribution and economic activity runs through political instability. Income inequality is

[1]These results are, in many respects, a generalization to a dynamic context of static models by Romer (1975), Roberts (1977) and Meltzer and Richard (1981).

[2]Alesina and Rodrik (1992) present similar findings on investment. The same authors (1991) show similar results on growth using the distribution of land ownership rather than the distribution of income.

[3]The latter result is consistent with somewhat puzzling results on the relationship between transfers and growth presented by Sala y Martin (1992) and Devarajan, Swaroop and Heng-fu Zou (1992).

likely to increase social discontent and fuel social unrest.[4] The latter, by increasing the probability of coups, revolutions, government changes or, more generally, increasing policy uncertainty, and, perhaps, threatening property rights, has a negative effect on investment and, as a consequence, reduces growth.

In testing these hypotheses, we connect with the second line of research mentioned above, which has investigated the relation between political instability and various measures of aggregate economic performance. For instance, Venieris and Gupta (1986) show that what they identify as "socio-political instability" has a negative effect on the saving rate.[5] Barro (1991) and especially Alesina, Ozler, Roubini and Swagel (1991) and Block- Bomberg (1992) find negative effects of political instability on growth.[6] Goodrich (1992) reports that political instability reduces foreign investment in LDC's. Benhabib and Spiegel (1992) show weak evidence on an inverse relationship between political instability and private domestic investment. Cukierman, Edwards and Tabellini (1992) and Edwards and Tabellini (1991) argue that political instability increases inflation. Ozler and Tabellini (1991) suggest that it also increases the amount of external debt accumulated by LDC's, while Alesina and Tabellini (1989) argue that it increases capital flights from the same countries.

In this paper we estimate on a cross-section of 72 countries a two-equation system in which the endogenous variables are investment in physical capital and a measure of political instability. We are particularly interested in two questions:

[4]On this point see, for instance, Huntington (1968).

[5]The same authors (Venieris and Gupta (1989)) present further evidence of interesting non-linearities in this relationship.

[6]Londegran and Poole (1990, 1991) in related work do not seem to find such evidence. For a discussion of their results and comparisons with other literature see Alesina, Ozler, Roubini and Swagel (1991).

(i) Does political instability reduce investment?

(ii) Does income inequality increase political instability?

If the answer to both questions were affirmative we could establish a link from income distribution to investment (and, therefore, growth) via political instability. The reason why we develop a tew- equation system is that we emphasize that economic and political development are jointly endogenous. This issue of joint endogeneity has been generally ignored in the literature cited above.[7]

Our empirical results suggest that the answer to both questions is in fact a "yes" with only minor qualifications. We find a strong negative effect from political instability to investment in both samples, 1970-85 and 1960-85. We also find that income inequality increases political instability in the sample 1960-85, while on this point the results for the sample 1970-85 are not as strong. Interestingly, our results suggest that the presence of an economically powerful middle-class reduces political instability and, therefore, stimulates capital accumulation.

This paper is organized as follows. In section 2 we address the problem of how to define and measure political instability. We present our definition and measure and we relate it to the literature. In section 3 we discuss data issues; we present our data set and highlight simple correlations between variables. Section 4 discusses the model specification. Section 5 presents the basic results. In section 6 we discuss various robustness tests and perform sensitivity analysis. Section 7 concludes.

[7]Exceptions are Londegran and Poole (1990), (1991), Alesina et al. (1991) and Block-Bomberg (1992).

2 Definition and measure of political instability.

Social and political instability are variables that are hard to define and measure in a way which can be used for econometric work. Political instability can be viewed in two ways. The first one emphasizes executive instability. The second one is based upon indicators of social unrest such as strikes, political violence, demonstrations etc.

The first approach defines political instability as the "propensity to observe government changes". These changes can be "constitutional", i.e. take place within the law, or "unconstitutional", i.e. they can be coups d'etat. The basic idea is that a high propensity to executive changes is associated with policy uncertainty and, in some cases, with threats to property rights. Note that the "propensity" to executive changes is distinct from the actual frequency of changes, and can be measured by probit regressions in which the probability of a change in the executive is related to several economic, socio-political and institutional variables.

For example Cukierman et al. (1992) and Edwards and Tabellini (1991) adopt this definition of instability in their work on inflation. One important issue, however, which these authors do not completely address is that of "joint endogeneity". On one hand, political instability affects aggregate economic outcome. On the other hand, the latter influences executive instability. Londegran and Poole (1990), (1991), Alesina et al. (1991) and Block-Bomberg (1992) have explicitly taken into account this problem in their work on executive instability and economic growth. Both sets of authors estimate two-equations systems. One equation is a probit regression, which estimates the propensity to government changes, while the other is a regression for economic growth.

The second approach does not focus directly on executive changes. Socio-political instability is measured by constructing an index which summarizes various variables capturing phenomena of social unrest. A key reference on this point is Hibbs (1973), who uses the method of principal components to construct such index. More recently, Venieris and Gupta (1986), (1989), Barro (1991), Ozler and Tabellini (1991) and Benhabib and Spiegel (1992) have used several indices of socio-political instability as an explanatory variable in various regressions in which the dependent variable is an economic one. As emphasized above, joint endogeneity issues are key here; in many cases there are good reasons to believe that the left hand side variable that one is attempting to explain as a function of socio-political instability (such as inflation, growth, investment etc.) is itself a determinant of social unrest.

Which of these two approaches to measuring political instability is superior is not clear a priori and may depend upon the specific issue under consideration. For instance, one may argue that, for *a given level of expected government turnover,* phenomena of social unrest do not have any direct impact on policy uncertainty, and therefore on economic decisions. This might be a strong but useful "identifying" assumption: policy changes relevant for economic decisions can occur only when governments change. On the other hand, one may argue that, particularly when it reaches very high levels, social unrest disrupts market activities and increases economic uncertainty above and beyond its direct effects on executive instability. Long and violent strikes, riots and physical threats to workers and capitalists engaged in productive activities can have direct effects on productivity and therefore on the rate of return to investment. Furthermore, the two

indices are likely to be correlated. In fact, the events of social unrest used directly as an index of instability in the second approach are often used as some of the right hand side variables in the probit regressions for government changes used in the first approach.

This paper adopts the second approach to measuring political instability. We explicitly take into account problems of joint endogeneity by estimating a system of two equations in which the two endogenous variables are investment and an index of socio-political instability, SPI.

Rather than constructing our own SPI index we obtain it by applying a formula suggested by Venieris and Gupta (1986). Two reasons have convinced us of this choice. First, as we argue below, this index is quite reasonable and appears consistent, both conceptually and empirically, with our priors concerning the meaning of socio- political instability. Second, by not constructing or own index, we cannot be accused of building the index which produces the best results for our purposes.

Venieris and Gupta (1986) propose the following index of socio-political instability (SPI):

$$SPI = .00065PROTEST + .127log(DEATHS + 1) + 2.84DEM \qquad (1)$$

where $PROTEST$ is the number of political demonstrations against a government; $DEATHS$ is the number of people killed in conjunction with any domestic political violence and DEM is a dummy variable that identifies democracies. A precise definition of these variables and their sources is given in Table 1, which summarizes notation, definitions and sources of every variable used in this paper.

The SPI index specified in equation (1) is derived by Venieris and Gupta (1986) by

applying discriminant analysis in a sample of countries which is a subset of our sample. These authors have considered a large set of variables, collected by Jodice and Taylor (1988), which represent various socio-political events. The two variables $PROTEST$ and $DEATH$ appear to be particularly useful in capturing two aspects of political unrest: $PROTEST$ captures less violent events, while $DEATHS$ capture more violent events. The variable $DEATHS$ is entered in logarithmic form to avoid an overwhelming weight being given to cases of civil wars with very large numbers of casualties. The variable DEM captures the idea of legitimacy. Our dummy variable for democratic institutions is different from the one used by Venieris and Gupta (1986). They use a dichotomous, zero/one variable, while we use the same classification proposed by Alesina, Ozler, Roubini and Swagel (1991) and described in Table 1. This classification identifies three categories. "Democracies" ($DEM = 0$) are countries with free competitive elections with more than one party running for office. "Dictatorships" ($DEM = 1$) are countries without free elections. "Semi-democracies" ($DEM = .5$) are countries with some forms of elections but with severe limits on political rights. The middle group captures countries like Mexico which, although not a dictatorship, has experienced severe limitations to political rights and freedom of multi-party elections. In repressive dictatorships it is more difficult (and costly) to protest against the government; more generally, expressions of political discontent are repressed. Furthermore, in certain dictatorships (particularly at low levels of income) the government controls the press and restricts the diffusion of information, particularly abroad. Thus, measures of social unrest are likely to be under-reported, for propaganda reasons, in dictatorships.

3 Data and sample period.

We perform cross sectional regressions in a sample of 72 countries for the periods 1960-1985 and 1970-85. The binding constraint on the number of countries is the availability of data on income distribution. We use the same data on income distribution assembled by Perotti (1992) which is virtually identical to the one used by Alesina and Rodrik (1991). The main source is Jain (1975). For a more complete description of sources of income distribution papers see the Appendix of this paper and Perotti (1992). The income distribution data consists of the income shares of the five quintiles of the population, measured as close as possible to the beginning of each sample period, 1960 for the 1960-85 sample and 1970 for the 1970-85 sample. In our specification, income distribution is treated as predetermined; therefore, it is appropriate to use this variable as measured at the beginning of the sample period.

The binding constraint on the initial date for our sample period is the availability of economic data. We use the same data employed by Barro (1991) and Perotti (1992). The end of our sample period (1985) is imposed by the availability of socio-political variables, which we have obtained from Jodice and Taylor (1988). These are the same variables used, for instance, by Venieris and Gupta (1986) and Alesina et al. (1991). The list of these variables is included in Table 1, as well.

Measurement errors are likely to be a problem for these variables. Specifically, one issue often emphasized is that of under-reporting of episodes of social unrest in poor countries, and particularly in Africa.[8] Partly for these problems, and partly for other

[8]Most of these variables are constructed by means of checking news reports, particularly in the New York Times. News of a riot in France are much more likely to be reported accurately than news of a riot

conceptual issues (discussed later) a regional dummy for Africa is always included in our equation for political instability.

We computed the SPI index on a yearly basis using the formula in eq. (1) and then we averaged over the 1960-85 and 1970-85 samples. Table 2 reports the average of the SPI index for the sample 1960-85. It is ordered from the poorest to the richest country, in terms of their per capita income in 1960. This ordering immediately highlights a strong positive correlation between poverty and socio-political instability.[9] Africa emerges from this table as a very unstable region. In the 1960-85 sample five of the seven countries with an SPI index above 3 are African. The other two are Burma and Iraq. Not surprisingly, the most stable countries are OECD democracies, even though several LDCs, such as Venezuela, are also relatively stable.

Table 3 reports our summary statistics for our variables and Table 4 highlights simple correlations between them.[10] The two key correlations for our purposes are those between SPI and INV and between SPI and the two income distribution variables that we use throughout the paper, $MIDCLASS$ and $TOPBOT$. $MIDCLASS$ represents the share of total income held by the third and fourth quintiles of the population, while $TOPBOT$ corresponds to the ratio of the share of the fifth quintile to the share of the first two quintiles. The reason why we use the share of the first two quintiles instead of the share of the first quintile is that the latter is likely to be subject to particularly severe measurement problems. Their effects would be amplified by the fact that the share of the

in Botswana.

[9]Note the case of Japan. This country has a much lower index of instability than countries at comparable level of development in 1960. Thirty years later this country is one of the richest in the world.

[10]Both tables cover the sample 1960-85 only.

first quintile is a small number at the denominator of a fraction with a large numerator: a small measurement error in the share of the first quintile causes a large change in the fraction.

The correlation between SPI and INV is -.64 . $MIDCLASS$ has a correlation of -.45 with SPI and $TOPBOT$ of .30. All of these signs are consistent with our hypothesis, namely that socio-political instability depresses investment and income inequality makes the socio-political environment more unstabe. Also, SPI is highly negatively correlated with both the level of income and the level of education. However, the latter two variables are highly correlated between each other (the simple correlation is almost .7); consequently, we do not use both variables at the same time in our SPI equation. The same argument applies to the investment equation, where we included only $PRIM$ and not GDP.

4 Model specification.

Our hypothesis is that socio-political instability reduces the propensity to invest. Several arguments justify this hypothesis. The most compelling one emphasizes the effect of socio-political instability on uncertainty: in a more uncertain environment investors may choose to postpone projects, invest abroad (capital flights) or simply consume more.[11] A high value of the SPI index implies high uncertainty for two reasons. First, when social unrest is widespread the probability of the government being overthrown is higher, making

[11] Venieris and Gupta (1986), (1989) study this effect on savings. Alesina and Tabellini (1989) show that political polarization increases capital flights and reduces domestic investment. Alesina et al. (1991) summarize several other channels through which more political instability reduces economic growth.

the course of future economic policy more uncertain. Second, social unrest may imply direct disruptions of productive activities. If workers are engaged instrikes or other forms of non-violent political protests, investors will be less likely to start or expand productive projects.

As to the effects of income inequality on socio-political instability, our hypothesis is that there should be a positive relation between these two variables. This idea is certainly not new: an example, among many, of work based on this notion is Huntington (1968). A large group of impoveridhed citizens, facing a small and very rich group of well-off individuals is likely to become dissatisfied with the existing socio-economic status quo and demand radical changes.[12]

We capture these two effects in the following basic specification of a simple bivariate simultaneous equation model in SPI and investment:

$$INV = \alpha_0 + \alpha_1 SPI + \alpha_2 PPPIDE + \alpha_3 EDUC + \alpha_4 AFRICA + \epsilon_1 \qquad (2)$$

$$SPI = \beta_0 + \beta_1 ID + \beta_2 GDP + \beta_3 INV + \beta_4 URB + \beta_5 AFRICA + \beta_6 LAAMER + \beta_7 ASIA + \epsilon_2 \qquad (3)$$

In the investment equation the most appropriate dependent variable would be private investment ($PRIVINV$) rather than total investment (INV), given the issue under consideration. However, the breakdown of investment between private and public is available only for 52 of the 72 countries of our sample and only from 1970 onward. Therefore, for the 1960-85 sample we are forced to use only INV. For the 1970-85

[12] A recent model that formalizes a similar argument is Benhabib and Rustichini (1991).

sample we present results using both variables.

Some comments on the specification of the two equations are necessary. As discussed above, we expect α_1 in the investment equation to be negative. It is also reasonable to expect that a higher PPP value of the investment deflator $PPPIDE$, due for instance to domestic distortions, should reduce the rate of investment. Thus, α_2 should be negative under the null. The variable $EDUC$ is a proxy for human capital. Complementarity between physical and human capital would imply a positive sign for α_3. Finally, we included one regional dummy for Africa. The argument for this choice is that it appears that investment data for sub-saharan Africa are particularly poor and likely to be over-reported.

One might argue that income distribution affects investment directly, not only through political instability. This might occur through essentially two channels. The first one is a "Kaldorian" saving function. According to Kaldor (1956), the "capitalists" save more in proportion to their income than the "workers". Thus, the more *unequal* is the distribution of income the higher is investment. On the other hand, Alesina and Rodrik (1991) and Bertola (1991) argue that the more unequal the distribution of income, the higher is the demand for fiscal redistribution through taxation of capital. The latter may depress investment by increasing the tax burden on investors. To test this hypothesis we have run a second specification in which we have added an income distribution variable to the list of regressors of the investment equation. Since the two channels discussed above go in opposite direction, the sign of the associated coefficient is a priori ambiguous. Results with the income distribution variables in the investment equation are presented in Table

6.

Turning to the SPI equation, recall that we expect a negative relation between inequality and growth. Accordingly, under the null hypothesis the sign of β_1 should be negative when an index of equality is used, and positive when an index of inequality is used. The variable GDP is also included to test a possible relation between poverty and instability: the basic notion is that "good things go together", so that richer countries are more stable. Thus, β_2 should be negative according to this hypothesis. Investment is included to test the idea that rapidly growing economies tend to be more stable, which implies a negative sign for β_3.[13] A variable for urbanization is also included. The expectation is that more urbanized countries should be more unstable, because political participation tends to be positively associated with urbanization. Therefore, β_4 is positive under our null hypothesis. Finally, we added regional dummies for two reasons. First, cultural and/or historical reasons may influence the amount of socio-political unrest in different regions of the world. Second, in certain regions, particularly Africa, under-reporting of events can be particularly acute.

Before proceeding, it might be appropriate to spend a few words to justify on a priory grounds our identifying assumptions. The first key identifying assumption is the exclusion of $PPPIDE$ from the SPI equation. This variable measures market distortions that should have a direct effect on investment decisions and a much less clear-cut effect on social unrest. A second identifying assumption is the exclusion of the education variable from the SPI equation. It can certainly be argued (see for instance Huntington

[13]See, however, Huntungton (1968) for an in depth discussion of possible non linearities in this relationship.

(1968)) that the level of education influences the level and type of socio-political activities. However, we include the level of GDP per capita in the same equation, a variable highly correlated with measures of school enrollment. Furthermore, the level of income probably better summarizes various indicators of "socio-economic quality of life" which, in turn, are likely to be highly correlated with social discontent.[14] On the contrary, investment should depend more directly upon a measure of human capital (see Benhabib and Spiegel (1992)). Therefore we have included $EDUC$ but not GDP in the investment equation. Finally, we feel that there are more compelling reasons (discussed above) to introduce exhaustive regional dummies in the SPI equation than in the investment equation.

Sensitivity analysis and further discussion on these identifying assumptions are presented below in Section 6.

5 Estimation results.

This section describes the results of the estimation of our base specification, equations (2) and (3). Table 5 reports results on both samples, using two measures of inequality, $MIDCLASS$ and $TOPBOT$ in each case. The first two columns of Table 5 refer to the two equation system as specified in equations (2) and (3). using $MIDCLASS$ as the income distribution variable in the SPI equation. The two key coefficients on which we focus are those that capture the effects of SPI on INV and of $MIDCLASS$ on SPI. Both coefficients have the expected signs and are significant at the 5% level: socio-political instability depresses investment and a rich middle class reduces socio-political

[14]See Ingram (1992) for a discussion concerning the correlation between several indicators of social development.

instability. Thus, these two results imply that the presence of a "healthy" middle class is conducive to capital accumulation because it creates conditions of social stability.

The other coefficients in the investment equation have the expected signs and are significant at high levels of confidence. The proxy for market distortions, $PPPIDE$, has a negative effect on investment, while education has a positive one. The dummy variable for Africa is positive and statistically significant, presumably pointing towards overestimation of investment in this region, as discussed above.

The estimation results for the SPI equation are also very sensible. Both GDP and INV have a negative impact on SPI. Richer countries, and countries that are accumulating and investing more are more stable. Urbanization has a positive coefficient, marginally insignificant at standard confidence levels. This result suggests that, as expected, urbanization fuels social unrest. This result on urbanization is consistent with the arguments of Huntington (1968) and the empirical tests of Ozler and Rodrik (1992) and Berg and Sachs (1988). They both argue that urbanization leads to more social demands and political pressure for redistributive policies. Of the regional dummies, only $AFRICA$ is marginally significant and with a positive sign.

Columns (2a) and (2b) refer to the same system, except that now the income distribution variable is not $MIDCLASS$, but $TOPBOT$, namely the ratio of the income share held by the richest quintile to the share of income held by the bottom 40% of the population. The results are very similar to those of columns (1a) and (1b). An increase in $TOPBOT$, i.e. an increase in income inequality, increases SPI. An increase in SPI reduces investment.

The next four columns report results when private investment ($PRIVINV$) is used as a dependent variable, rather that total investment. As mentioned in section 4, this variable is available only for a subset of countries and after 1970. Thus, for these regressions is 1970-85. The effect of SPI on private investment remains very strong and significant. However, the income distribution variables are insignificant in the SPI equation, although they have the correct sign. In order to check whether private and total investment behave differently we have also run the same regressions using total investment averaged over the same sample period, i.e. 1970-85. The results (not reported here) are very similar to those obtained using private investment. This result suggests that the differences between the results of the first four columns of Table 5 and those of the last four are due to the different sample period, rather than to the differences between $PRIVINV$ and INV. As a matter of fact, the fraction of public investment in INV is generally rather small, except for some countries in Africa. Thus, one can speculate that our results for the 1960-85 sample would hold even if we could use a measure of $PRIVINV$ for this sample period as well.

With these qualifications, we can summarize our results in the following way: more inequality leads to socio-political instability which, in turn, slows down the process of capital accumulation. In the next section we discuss the robustness of these results.

6 Robustness and sensitivity analysis.

Several alternative specifications have been estimated, but the key results described in section 5 do not disappear. First, we tried various permutations of regional dummies. We

added a complete set of such dummies in the investment equation. Except for $AFRICA$, no other dummy was significant and the results were unaffected. We dropped the regional dummies from the SPI equation: this change did not affect the relevant coefficients, but the fit of the regressions worsened somewhat.

Second, we replaced the variable URB with the share of the labor force employed in agriculture. The urbanization variable seems to have more explanatory power in the SPI equation. In any case our results were unaffected.

Third, we added the variables $EDUC$ in the SPI equation and GDP in the investment equation. As noted above, the two variables are highly correlated. Regardless of which combination of $EDUC$ and GDP is used in the two equations our two results hold. Furthermore, a Hausman test that uses 2SLS and 3SLS estimates has a higher significance level in the case of the basic specification of Section 5 than when any other combination of GDP and $EDUC$ in the two equations. SPI is more directly affected by the level of income, rather than by the enrollment ratio in primary schools, while the opposite holds for investment.

Finally, we added a measure of income distribution in the investment equation. The results are displayed in Table 6. While the other coefficients are virtually unaffected, the effect of income distribution on investment is ambiguous. In some cases we obtain that more inequality increases investment, while in others the results are less conclusive. Perhaps, one may detect a pattern in these results that suggest that the presence of a wealthy middle class fosters investment directly, above and beyond its indirect effects through SPI. However, our results on this point are not very strong.

It is useful to compare this findings with those obtained by Alesina and Rodrik (1992). In a reduced form they show that income inequality has adverse effects on investment. Our results suggest that the link between these two variables is SPI. In fact, after controlling for SPI, inequality does not seem to influence investment directly.

A different way to look at the robustness of these results is to estimate the model using robust estimation methods. Roughly speaking, robust regression methods provide estimators that downweigh those observations that are "outliers". One dimension along which the robust estimators differ is the definition of an "outlier". Typically, an outlier is characterized by a large residual. We have chosen to estimate the SPI and INV equations by applying the bounded-influence estimator proposed by Krasker and Welsch (1982). The main reason is that this estimator identifies and downweighs outliers not only in the residuals' space, but also in the regressors' space. As shown by Krasker and Welsch (1983), an observation can be very influential and nevertheless the residual corresponding to that observation may be smaller than most other residuals. Since we are estimating a simultaneous-equation model, we implement the 2SLS version of the Krasker and Welsch estimator.[15]

Table 7 shows the Krasker and Welsch estimates of the SPI and INV equations, for the basic specification and both the 1960-85 ant the 1970-85 periods. Therefore, each column of Table 7 presents the 2SLS Krasker-Welsch estimate of the correspondign column of Table 6. One can see immediately that the point estimates of virtually all the

[15] Robust estimator for 3SLS have not been devised yet. See Krasker and Welsch (1982) and Krasker,Kuh and Welsch (1983) for a theoretical treatment of robust estimators, and Kuh and Welsch (1980) and Peters,Samarov and Welsch (1982) for some applications. The estimates of this section are obtained by applying a RATS program implemented in Perotti (1992).

coefficients are not very different from those of the 2SLS estimators. Note that the relative efficiency of the Krasker-Welsch estimator is always quite low relative to typical values of .9 or .95 used in applied work. The reason is that, the less efficient is the Krasker-Welsch estimator relative to the 2SLS estimator, the easier it is for an observation to be considered an outlier. In the case of the SPI and INV equations estimated here, at levels of relative efficiency of .9, the Krasker-Welsch estimator was usually identical to the 2SLS estimator, since no observation was sufficiently far away from the others to be considered an oulier. These results are therefore quite reassuring: although there are well known measurement error problems in income distribution data, they are not of such a nature as to make the estimates of the model very sensitive to some particular observation.

7 Conclusions.

Income inequality increases socio-political instability which in turn decreases investment. These findings, obtained for a sample of 72 countries, are quite robust, particularly in the sample 1960-85.

These results have positive and normative implications. From a positive point of view they suggest an argument that might help explain different investment and growth performances in different parts of the world. Several countries in South East Asia (and particularly the "four dragons", Hong Kong, Singapore, South Korea and Taiwan) have had very high growth rates in the post-WWII period. In the aftermath of the war, these countries had land reforms that reduced income and wealth inequality. Furthermore, and,

perhaps as a result of this reform, these countries have been relatively stable politically, compared to, say, Latin American countries. The latter, in turn, have had a much more unequal income distribution, more socio-political instability and less growth.

From a normative point of view, our results have some implications for the effects of redistributive policies. Fiscal redistribution, by increasing the tax burden on capitalists and investors, reduce the propensity to invest (Alesina and Rodrik (1991)). However, the same policies may reduce social tensions and, as a result, create a socio-political climate more conducive to productive activities and capital accumulation.[16]Thus, by this channel fiscal redistribution might actually spur economic growth.

This paper, not unlike the related literature surveyed in the introduction, focuses on policy outcomes (investment, growth etc.) and relates them to socio-economic variables. The next step in this line of research is to look more explicitly at actual policy instruments, as Perotti (1992) has started doing. The link between politics and economic outcomes goes through policy choices, particularly, in this context, fiscal policy. Several questions are left open at this point. For instance, what are the effects of income inequality on the degree of redistribution implemented in different political systems? Who actually benefits from such redistributions? What are the distributional effects of different spending programs? Do the very poor really benefit from government programs toward them? At a minimum, answering these questions requires the use of more disaggregated fiscal policy data than have been used so far.

[16]A similar argument has been put forward by Sala y Martin (1992).

Table 1: Definition of variables and data sources.

This Table describes the data used in the regressions. All the data are from the Barro-Wolf [1990] data set, except for the income distribution data (which are from a variety of sources detailed in Table A.1 in the Appendix) or unless otherwise indicated.
GDP: GDP in thousands of 1980 dollars, from the Summers-Heston data set.
EDUC: primary school enrollment rate in year 1960 or 1970.
MIDCLASS: share of the third and fourth quintiles of the population in or around 1960 or 1970.
TOPBOT: ratio of the share of the fifth quintile to the share of the first and second quintiles, in or around 1960 or 1970;
URB: Urban population as percentage of total in year 1960 or 1970. Source: World Bank Tables;
INV: ratio of real domestic investment (private plus public) to real GDP (average from 1970 to 1985 or from 1960 to 1985.);
PRIVINV: Ratio of real private domestic investment to real GDP (average from 1970 to 1985);
PPPIDE: Deviation of the PPP value for the investment deflator from the sample mean, 1960;
SPI: index of socio-political instability, constructed using the formula of equation (1), average over 1960-85 or 1970-85.

Table 2: SPI index (sample 1960-85).

COUNTRY	SPI60	COUNTRY	SPI60
Tanzania	2.90	Turkey	1.93
Malawi	2.90	Panama	2.39
Sierra Leone	2.87	Brazil	2.86
Niger	2.87	Colombia	1.18
Burma	3.22	Jamaica	.11
Togo	2.85	Greece	1.07
Bangladesh	2.97	Costarica	.004
Kenia	3.06	Peru	2.82
Botsawana	.74	Iran	2.98
Egypt	2.26	Mexico	1.72
Chad	3.03	Japan	.05
India	.65	Spain	2.25
Morocco	2.93	Iraq	3.17
Nigeria	3.12	Ireland	.07
Pakistan	2.26	South Africa	1.71
Congo	2.96	Israel	.16
Benin	2.90	Chile	1.27
Zimbabwe	2.66	Argentina	2.66
Madagascar	2.91	Italy	.20
Sudan	3.14	Uruguay	1.32
Thailand	2.87	Austria	.02
Zambia	2.65	Finland	.008
Ivory Coast	2.84	France	.13
Honduras	2.44	Holland	.03
Senegal	1.99	U.K.	.26
Gabon	2.87	Norway	.004
Tunisia	2.89	Sweden	.01
Thailand	2.90	Australia	.002
Philippines	2.61	Germany	.09
Bolivia	2.86	Venezuela	.23
Dom. Republic	1.13	Denmark	.0007
Sri Lanka	.09	New Zealand	.0006
El Salvador	2.91	Canada	.03
Malaysia	.40	Switzerland	.0007
Ecuador	1.75	U.S.A.	.37

Table 3: Summary statistics (sample 1960-85).

	NOBS	MEAN	STD. ERR.	MIN.	MAX.
INV	72	19.34	7.32	6.82	36.91
SPI	70	1.68	1.26	0.00	3.21
GDP	72	2.05	1.88	.021	7.38
EDUC	72	79.14	30.77	5.00	144.00
MIDCLASS	72	33.08	5.73	20.10	41.90
TOPBOT	72	4.31	2.40	1.32	13.85
URB	65	39.33	23.19	4.00	82.00
PPPIDE	72	-.004	.25	-.49	.86

For definitions of variables and sources, see Table 1.

Table 4: Correlation matrix (sample 1960-85).

	INV	SPI	GDP	EDUC	MIDCLASS	TOPBOT	URB	PPPIDE
INV		-.64	.52	.64	.29	-.08	.51	-.30
SPI	-.64		-.73	-.69	-.45	.30	-.60	.05
GDP	.52	-.73		.69	.41	-.24	.77	.08
EDUC	.64	-.69	.69		.23	-.06	.74	-.03
MIDCLASS	.29	-.45	.41	.23		-.61	.35	-.11
TOPBOT	-.08	.30	-.24	-.06	-.61		.24	-.09
URB	.51	-.60	.77	.74	.35	-.24		.04
PPPIDE	-.30	.05	.08	-.05	-.11	-.09	.04	

For definitions of variables and sources, see Table 1.

Table 5: Investment and SPI equations, 1960-85 and 1970-85.

	INV	SPI	INV	SPI	PRIVINV	SPI	PRIVINV	SPI
	(1a)	(1b)	(2a)	(2b)	(3a)	(3b)	(4a)	(4b)
constant	15.41	4.08	14.61	2.71	12.42	2.32	12.48	2.55
	(3.26)	(4.92)	(3.08)	(4.42)	(2.60)	(3.04)	(2.62)	(3.55)
EDUC	.10		.10		.10		.10	
	(2.48)		(2.62)		(2.37)		(2.36)	
SPI	-2.89		-2.67		-3.27		-3.29	
	(-2.62)		(-2.40)		(-3.51)		(-3.53)	
PPPIDE	-8.83		-8.82		-7.74		-7.74	
	(-3.83)		(-3.85)		(-3.18)		(-3.18)	
AFRICA	2.83	.74	2.81	.59	3.97	.47	3.97	.49
	(1.46)	(1.85)	(1.45)	(1.44)	(1.70)	(.92)	(1.70)	(.96)
GDP		-.31		-.33		-.26		-.26
		(-3.42)		(-3.66)		(-2.91)		(-2.88)
INV		-.06		-.07				
		(-2.19)		(-2.65)				
PRIVINV						-.05		-.04
						(-1.16)		(-1.14)
MIDCLASS		-.04				.01		
		(-2.01)				(.30)		
TOPBOT				.09				-.02
				(2.04)				(-.35)
URB		.01		.01		.01		.01
		(1.35)		(1.49)		(.92)		(.71)
LAAMER		-.01		-.12		.33		.38
		(-.03)		(-.34)		(.89)		(.90)
ASIA		.28		.19		.30		.30
		(.80)		(.54)		(.30)		(.70)

2SLS. t-statistics in parentheses. Estimates using 3SLS are very similar. First four columns: 1960-85. Last four columns: 1970-85. Number of observations: 64 (1960-85) and 53 (1970-85).

Table 6: Investment and SPI equations, second specification, 1960-85 and 1970-85.

	INV	SPI	INV	SPI	PRIVINV	SPI	PRIVINV	SPI
	(1a)	(1b)	(2a)	(2b)	(3a)	(3b)	(4a)	(4b)
constant	15.54	4.08	15.10	2.71	6.97	2.27	12.25	2.57
	(1.56)	(4.92)	(2.93)	(4.42)	(1.28)	(2.97)	(2.64)	(3.59)
EDUC	.10		.10		.09		.10	
	(2.26)		(2.18)		(2.43)		(2.52)	
SPI	-2.77		-2.89		-2.60		-3.03	
	(-1.81)		(-2.04)		(-2.82)		(-3.24)	
PPPIDE	-8.81		-8.73		-2.60		-3.03	
	(-3.83)		(-3.75)		(-3.28)		(-3.26)	
AFRICA	2.81	.74	2.76	.59	3.29	.47	3.91	.49
	(1.44)	(1.85)	(1.42)	(1.44)	(1.47)	(.91)	(1.71)	(.97)
GDP		-.31		-.33		-.27		-.26
		(-3.42)		(-3.66)		(-2.98)		(2.86)
INV		-.06		-.07				
		(-2.19)		(-2.65)				
PRIVINV						-.04		-.04
						(-1.00)		(-1.20)
MIDCLASS	.02	-.04			.14	.01		
	(.11)	(-2.01)			(1.57)	(.23)		
TOPBOT			.08	-.09			-.13	-.02
			(.25)	(2.04)			(-.47)	(-.34)
URB		.01		.01		.01		.01
		(1.85)		(1.49)		(.73)		(.72)
LAAMER		-.01		-.12		.34		.37
		(-.03)		(-.34)		(.89)		(.89)
ASIA		.28		.19		.29		.30
		(.80)		(.54)		(.69)		(.79)

2SLS. t-statistics in parentheses. Estimates using 3SLS are very similar. First four columns: 1960-85. Last four columns: 1970-85. Number of observations: 64 (1960-85) and 53 (1970-85).

Table 7: Robust regressions, 1960-85 and 1970-85.

	INV	SPI	INV	SPI	PRIVINV	SPI	PRIVINV	SPI
	(1a)	(1b)	(2a)	(2b)	(3a)	(3b)	(4a)	(4b)
constant	13.60	4.21	12.93	3.16	14.22	3.12	14.22	2.27
	(2.40)	(5.65)	(2.42)	(6.23)	(2.24)	3.93)	(2.21)	(5.51)
EDUC	.11		.12		.08		.08	
	(2.40)		(2.64)		1.42)		(1.43)	
SPI	-2.61		-2.48		-3.59		-3.59	
	(-2.02)		(-2.02)		(-3.07)		(-3.09)	
PPPIDE	-8.76		-8.91		-8.51		-8.52	
	(-3.12)		(-3.39)		(-2.54)		(-2.55)	
AFRICA	3.70	.60	3.86	.35	3.33	.64	3.33	1.06
	(1.58)	(1.72)	(1.76)	(1.05)	(1.05)	(1.47)	(1.05)	(3.83)
GDP		-.27		-.25		-.17		-.16
		(-3.48)		(-3.44)		(-2.13)		(-3.27)
INV		-.05		-.07				
		(-2.07)		(-3.15)				
PRIVINV						-.05		-.03
						(-1.27)		(-1.50)
MIDCLASS		-.03				-.01		
		(-2.11)				(-.56)		
TOPBOT				.13				-.01
				(3.46)				(-.35)
URB		-.003		-.005		-.005		-.004
		(-.46)		(-.77)		(-.65)		(-.89)
LAAMER		.21		-.06		1.01		1.35
		(.76)		(-.21)		(3.03)		(5.85)
ASIA		.49		.19		.61		1.21
		(1.64)		(.68)		(1.68)		(5.28)
Rel.eff.	.85	.73	.85	.73	.75	.57	.75	.60

2SLS. t-statistics in parentheses. First four columns: 1960-85. Last four columns: 1970-85. Number of observations: 64 (1960-85) and 53 (1970-85).

Appendix: Sources of income distribution data.

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